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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/814,575	04/01/2004	Aric Maharshak	P-6626-US	6914

49443 7590 11/30/2006

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EXAMINER

FRIEDHOFER, MICHAEL A

ART UNIT PAPER NUMBER

2832

DATE MAILED: 11/30/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

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Office Action Summary

Application No.

10/814,575

Applicant(s)

MAHARSHAK ET AL.

Examiner

Michael A. Friedhofer

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 18 September 2006.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-23 and 25 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-23 and 25 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- ☒ Notice of References Cited (PTO-892)
- ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- ☐ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____
- ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- ☐ Notice of Informal Patent Application
- ☐ Other: _____

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 1-6, 9, 11-13, and 19-23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nakatani et al in view of Burgess et al.

Nakatani et al discloses in figures 1-3b a circuit board comprising a first conductive area on one side of board 1 and a second conductive area on a second side of the board 1; a plurality of through holes 13 are formed from the one side through to the second side; and a conductive material 3 substantially filling the plurality of holes and capable of forming an electrical connection between the two conductive areas. The diameter of the holes is approximately equal to the thickness of the board. The conductive material is applied to the board in a liquid form. The holes are formed in the board before the conductive areas are applied to the board. The conductive material includes particles of a nonconductive material. The first conductive area is a conductive line. The substrate is porous. The first and second conductive areas overlap. There are at least two holes. The conductive material is either painted or silk screened onto at least one side of the board. The total electrical current passing through the conductive material substantially filling the plurality of holes is above a

threshold current. The conductive material is forced into the holes by painting or silk screen painting.

Nakatani et al does not specifically state that the method of forcing the material is via capillary action.

Burgess et al teaches a method of manufacturing a circuit board in which a conductive paste or liquid is applied to a circuit board and is forced through vias in the board using a capillary force.

It would have been obvious to one of ordinary skill in the art to apply the teachings of Burgess et al to Nakatani et al to specifically utilize a capillary action because the method of assembly would not alter the operation or function of the switch and using a capillary force provides another method in which to ensure that the vias are completely filled for proper connection on either side of the board. It would have been a matter of engineering design choice not affecting the operation, function, or structure of the circuit board as long as substantially all of the hole is filled by the conductive material.

3. Claims 7, 8, and 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nakatani et al as modified by Burgess et al in view of Higuchi et al.

Nakatani et al discloses all of the claimed limitations with the exception of the circuit board being a flexible non-conductive substrate and that the holes be less than 2 mm.

Higuchi et al teaches the filling of the vias or through holes in a flexible printed circuit board completely for providing the connection between conductive areas

on either side of the nonconductive substrate. The holes are less than 2 mm in diameter.

It would have been obvious to one of ordinary skill in the art to apply the teachings of Higuchi et al to Nakatani et al to utilize the same method of filling the via holes in a circuit board for a flexible circuit board because the purposes of both references is to ensure a proper connection between the two conductive areas.

4. Claims 15, 16, and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nakatani et al as modified by Burgess et al in view of Yamazaki et al.

Nakatani et al teaches all of the claimed limitations with the exception of specifically stating that the board is utilized in a switch.

Yamazaki et al teaches the use of a circuit board 1 having via holes filled with conductive material 13 so that the switches may be connected to circuits on the opposite side of the board.

It would have been obvious to one of ordinary skill in the art to apply the teachings of Yamazaki et al to Nakatani et al to utilize the board of Nakatani et al in a switch because the neither the purpose of the switch nor the purpose of the circuit board would be altered and the board of Nakatani et al provides a process for completely filling the holes to ensure a positive connection between the two sides of the board.

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5. Claim 17 is rejected under 35 U.S.C. 103(a) as being unpatentable over Nakatani et al in view of Yamazaki et al and Burgess et al as applied to claims 15 and 16 above, and further in view of Higuchi et al and Kawakubo.

Nakatani et al as modified by Yamazaki et al teach all of the claimed limitations with the exception of the circuit board being a flexible printed circuit.

Higuchi et al teaches that the via holes in flexible printed circuits are filled to provide a sure connection between conductive areas on both sides of the board.

Kawakubo teaches that both printed circuit boards and flexible printed circuits may be utilized in the formation of switches.

It would have been obvious to one of ordinary skill in the art to apply the teachings of Higuchi et al and Kawakubo to Nakatani et al as modified by Yamazaki et al to utilize a flexible printed circuit because neither the purpose of the switch or the board would be altered by the use of a flexible printed circuit rather than a circuit board in which the holes in Higuchi et al are filled for the same purpose as Nakatani et al and Kawakubo teaches the interchangeability of the types of boards within switches.

Allowable Subject Matter

6. Claim 10 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

7. Claim 25 is allowed.

8. The following is a statement of reasons for the indication of allowable subject matter: The prior art does not teach or suggest adding an adhesive capable of holding a portion of the first conductive area onto the first side of the board nor that in the method of making includes the step of anchoring a portion of the first conductive area on a first side of the substrate with the conducting liquid.

Response to Arguments

9. Applicant's arguments with respect to claims 1-23 and 25 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

10. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

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Any inquiry concerning this communication or earlier communications from the examiner should be directed to Michael A. Friedhofer whose telephone number is 571-272-1992. The examiner can normally be reached on Mon-Fri 6:00 - 2:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Elvin Enad can be reached on 571-272-1990. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.



Michael A. Friedhofer
Primary Examiner
Art Unit 2832

maf